

REMARKS

In view of the above amendments and the following remarks, reconsideration of the objections and rejections contained in the Office Action of June 30, 2003 is respectfully requested.

In order to make necessary editorial corrections, the entire specification and abstract have been reviewed and revised. As the revisions are quite extensive, the amendments to the specification and abstract have been incorporated into the attached substitute specification and abstract. No new matter has been added by the revisions. Entry of the substitute specification is thus respectfully requested.

The Examiner has objected to the drawings due to various informalities. In particular, the Examiner asserts that Figures 3 and 4 require a designation such as "Prior Art" because only that which is old is illustrated, and asserts that the drawings do not show the stator windings connected in parallel as described in the specification and recited in the claims. In view of these objections, Figures 2- 4 have been amended as shown in the attached new formal drawings. Specifically, Figure 2 has been amended in order to show the stator windings of the motors connected in parallel, and Figures 3 and 4 have been amended so as to be labeled as "Prior Art" as required by the Examiner. In addition, Figures 2 and 4 have been amended to correct typographical errors by changing the term "molecular" to "molecular." These changes to the figures have been made only to correct formal matters, and it is submitted that these changes do not add any new matter. Therefore, the Examiner is respectfully requested to enter the new formal drawings, and it is submitted that these new formal drawings overcome the Examiner's objections to the drawings as set forth in the Office Action.

The Examiner has rejected claims 2 and 9 under 35 USC § 112, first paragraph, as containing subject matter that was not sufficiently described in the specification. In particular, it appears that the Examiner believes that it is not clear whether the individual stator winding of each motor is connected in parallel, or whether the stator windings as a group (i.e., the stator windings of all the motors) are connected in parallel. If the Applicants' understanding of the Examiner's rejection is correct, it is submitted that one of ordinary skill in the art would clearly understand that the specification teaches that the motors (including the stator winding of each motor) are connected in parallel to a common power circuit. Furthermore, the Examiner is requested to note that original

claims 1-9 have been cancelled and replaced with new claims 10-24, including new dependent claims 11 and 12 which correspond to original claim 2, and new independent claim 22 which corresponds to original independent claim 9. The new claims have been drafted in an attempt to address the Examiner's formal rejections discussed above, and so as to fully comply with all the requirements of 35 USC § 112. Consequently, it is respectfully submitted that the Examiner's rejections under § 112 are not applicable to the new claims.

The Examiner has rejected claims 1 and 3 as being anticipated by the Onuma reference (JP 63228941); has rejected claim 2 as being unpatentable over the Onuma reference in view of the Abukawa reference (USP 6,335,582); and has rejected claims 4-8 as being unpatentable over the Onuma reference in view of the Miki reference (USP 4,878,813). However, as indicated above, original claims 1-9 have been cancelled and replaced with new claims 10-24, including new independent claims 10, 15, and 22. For the reasons discussed below, it is respectfully submitted that new claims 10-24 are clearly patentable over the prior art of record.

New independent claims 10 and 15 are directed to a compound motor and a vacuum pump, respectively, comprising *a plurality of motors* and a plurality of rotating members *arranged adjacent to each other in an axial direction along a common axis of rotation* so as to share the common axis of rotation. Each motor includes a stator having a stator winding, and a stator winding of each of the motors has a *different number of poles* than a stator winding of each of the other motors. Each motor also includes a rotor rotatably supported on the stator. The rotor of each of the motors rotates about a common axis of rotation, and each of the rotating members is attached to a corresponding rotor of one of the motors.

A description of the arrangement and the advantages of the compound motor and vacuum pump as recited in new independent claims 10 and 15 will now be provided with reference to the drawings and the specification of the present application. However, references to the portions of the present application is provided only for the Examiner's benefit, and is not intended to otherwise limit the scope of the claims to the specific disclosed embodiments.

As illustrated in Figure 1 and described in the specification, the present invention provides a plurality of motors 20, 30, 40 and a plurality of rotating members 22, 32, 42 attached to a

corresponding rotor of one of the motors 20, 30, 40. As clearly illustrated in Figure 1, the rotating members are arranged adjacent to each other in an axial direction along a common axis of rotation so as to share the common axis of rotation. Furthermore, as described in the specification, the stator winding of each motor has a different number of poles than the stator winding of each of the other motors. Therefore, when the motors are connected to a common power circuit, the rotating members will be rotated at different speeds based on the number of poles of the stator winding of the corresponding motor.

Due to the combination of the motors having different numbers of poles and the arrangement of the rotating members as described above, when the compound motor or vacuum pump is used to evacuate a vessel, an ultra high vacuum can be achieved at one end (for example, the inlet end), while discharge gases can be satisfactorily discharged from a second end at atmospheric pressure (for example, an exhaust port end) without the necessity of using a pre-evacuating pump, and also with the necessity of engaging or disengaging any of the rotating members (see page 8, line 14 through page 9, line 23 of the original specification).

The Onuma reference discloses a compound motor including a first motor 33 for rotating a first outer wheel (rotating member) 32b, and including a second motor 34 for rotating a center wheel (rotating member) 32a. However, as clearly illustrated in Figure 1 of the Onuma reference, the center wheel 32a and the outer wheel 32b are arranged in a *radial direction* (rather than an axial direction) with respect to a common axis of rotation. Thus, it is respectfully submitted that the Onuma reference does not disclose or suggest the combination of rotating members and motors designed and arranged as recited in new independent claims 10 and 15.

The Miki reference discloses a vacuum pump including a first rotor 26 and a second rotor 28 that can rotate independently of each other. In particular, a single motor drives one of the rotors, and the other rotor can be connected or disconnected from the driven rotor as necessary for operation. However, the Miki reference also does not disclose or suggest the combination of rotating members and motors as recited in new independent claims 10 and 15.

Moreover, the Miki reference does not even teach that the rotors are connected to separate motors rotating at different speeds. In contrast, the Miki reference merely teaches that the rotors can

be interconnected (driven simultaneously at the same speed) or disconnected to perform either a high or low vacuum operation as necessary by being rotated by a single motor. Thus, the principle of operation of the Miki invention is completely different than the operating principle of the Onuma reference (which uses multiple motors having different number of poles to rotate at different speeds, so that there is no need to connect and disconnect rotors). Therefore, one of ordinary skill in the art would not be motivated to even consider combining these two references.

The Abukawa reference discloses a revolving electrodynamic machine with a concentration winding stator, but does not disclose or suggest a plurality of motors and a plurality of rotating members arranged as recited in new independent claim 10. Thus, because the Onuma reference, the Miki reference, and the Abukawa reference do not disclose or suggest a plurality of motors and a plurality of rotating members arranged as recited in new independent claims 10 and 15, it is submitted that one of ordinary skill in the art would not be motivated to modify or combine the references so as to obtain the invention recited in new independent claims 10 and 15. Accordingly, it is respectfully submitted that new independent claims 10 and 15, and the claims that depend therefrom, are clearly patentable over the prior art of record.

New independent claim 22 is directed to a method of evacuating a vessel, in which a plurality of motors is arranged within a casing so that the motors rotate about a common axis of rotation, and in which the stator winding of each of the motors has a different number of poles than the stator winding of each of the other rotors. A plurality of rotating members is arranged within the casing and adjacent to each other in an axial direction along the common axis of rotation so as to share the common axis of rotation, and each of the rotating members is attached to a corresponding one of the motors. The motors are connected in parallel to a common power circuit, and an exciting current is supplied to the motor simultaneously so as to operate the motors at different speeds based on the number of poles of the stator winding of each of the motors.

This process enables an ultra-vacuum region to be maintained at the inlet port of the casing while an atmospheric pressure region is maintained at the exhaust port of the casing. Thus, as explained above with respect to independent claims 10 and 15, there is no need to provide a pre-evacuating pump along with an associated controller when evacuating a vessel to the molecular flow

range, and the rotating members can be operated simultaneously at different speeds without having to connect and disconnect the rotating members.

As explained above with respect to independent claims 10 and 15, the Onuma reference, the Miki reference, and the Abukawa reference do not, either alone or in combination, disclose or suggest arranging a plurality of motors and a plurality of rotating members as recited in claim 22. In addition, the references do not disclose or suggest *simultaneously applying current to all of the motors* arranged as recited so that the motors operate at different speeds. Therefore, one of ordinary skill in the art would not be motivated to modify or combine the references so as to obtain the invention recited in new independent claim 22. Accordingly, it is respectfully submitted that new independent claim 22 and the claims that depend therefrom are clearly patentable over the prior art of record.

In view of the above amendments and remarks, it is submitted that the present application is now in condition for allowance. However, if the Examiner should have any comments or suggestions to help speed the prosecution of this application, the Examiner is requested to contact the Applicant's undersigned representative.

Respectfully submitted,

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